Token Ring Page
Network initialization
Dec 20, 1989

Introduction

The token ring chipset must be initialized and opened onto the network before any network communication can take place. This application page contains that necessary logic. It can be run manually step-by-step, or it can be run automatically as an "auto-page" application, which is the normal case. The system initialization code checks to see if the network is already open; if it is not, it checks for the presence of the Token Ring Page application as page "T" with the title TOKEN RING INIT and schedules it for auto-page execution.

Display layout

```
 0          T TOKEN RING INIT 12/19/89 1022
 1          *RESET
 2          *INITIALIZE  IR:0040
 3          *OPEN       SSB:
 4          *RECEIVE  $105100: PARLIST
 5          *TRANSMIT $XXXXXX: PARLIST N<  >
 6          COMPLETION STATUS
 7           1       RING STATUS
 8           2       COMMAND REJECT
 9           3       OPEN
10           4       TRANSMIT
11           6       RECEIVE
12          $FFFC10: BOARD ADDRESS
13          $105000: SCB ADDRESS
14          $105008: SSB ADDRESS
```

To operate the program manually, interrupt under *RESET to reset the chipset. After about 1 second, the Interrupt Register, shown in hexadecimal after the IR:, should settle to a value of 0040, meaning that the bring-up diagnostics built into the chipset have completed successfully. If bit#5 and bit#4 (mask=0030) are set, the bring-up diagnostics have detected an error indicated by the code in the low 4 bits of the register as follows:

    0   Initial Test Error
    1   Adapter ROM CRC Error
    2   Adapter RAM Error
    3   Instruction Test Error
    4   Context/Interrupt Test Error
    5   Protocol,Handler Hardware Error
    6   System Interface Register Error

These error codes are listed in the "TMS380 Adapter Chipset User's Guide" by Texas Instruments, the manufacturer of the token ring chipset.

Interrupt under the *INITIALIZE to initialize the chipset. This completes

`FFFFD1D7C5D9C3D4`. If a value appears with bit#4 set (mask=`0010`), the low 4 bits may exhibit one of the following initialization error codes:

1 Invalid initialization block
2 Invalid options
3 Invalid receive burst count
4 Invalid transmit burst count
5 Invalid DMA abort threshold
6 Invalid SCB
7 Invalid SSB
8 DIO parity
9 DMA timeout
A DMA parity error
B DMA bus error
C DMA data error
D Adapter check

This table was copied from the TMS380 manual referred to above. Further details are found therein.

Interrupt under `*OPEN` to open onto the token ring network. This takes about 20–30 seconds and should result in the first word of the SSB to change to `0000` after having been set to `0003` when starting the OPEN operation.

Interrupt under `*RECEIVE` to allow reception of token ring network frames. A count should show up on line 11 indicating the successful initiation of the Receive command, and a completion status value of `8000` should appear. The receive logic of the node is now enabled. The transmit logic will be automatically initialized when the first frame is transmitted.

In summary, one can initialize the chipset manually by interrupts on lines 1–4 in sequence with appropriate delays for each action to complete.

Completion status

The program monitors the SSB to observe network chipset activity. Since it only executes every 15th second cycle, it can easily miss such activity. It displays the completion status on the appropriate line and keeps a count of the number of such occurrences. For the case of a received frame, the `CSTAT` from the Receive Parameter List is shown instead, along with the received frame size.

Automatic operation

While the program is being operated automatically, following system reset, one can monitor the actions of the program as they are taken in sequence. The interrupt register is checked to make sure the chipset is behaving as expected. If it is not, retries will be made. If all retries fail, it just stops, and the program

collecting data and scanning for alarms, etc. But network transmissions are held off while network initialization takes place. Messages to be sent to the network are queued through the usual `OUTPQ` mechanism. When the Receive command has been issued, following a successful Open, any messages queued for transmission will be sent to the intended destination nodes. The normal timeout imposed by logic in the `OUTPQMON` routine of the QMonitor Task, is also disabled during network initialization.

Transmit testing

This documentation describes how Page T performs in the pSOS version of the system, in which a chain of Transmit Parameter Lists is used. A previous version of the system used only a single TPL and thus could not queue multiple frames to the chipset for more efficient network transmission. In that system, one could use the line beginning with `*TRANSMIT` to send multiple copies of the same frame that was last sent. It was a means of kludging up network transmission activity for diagnostic purposes. It wasn't used much.

Token Ring boards

The program automatically determines which token ring board is in use and acts accordingly to accomplish that board's initialization. The two board types supported are the Fermilab board and the Proteon board. Each board uses the same TI chipset, but the Proteon board has some special board registers that must also be set up.

Local board only

This is one of the few application programs that must be used locally; i.e., one cannot initialize another station's token ring board over the network, of course. (Another page that has a local-only characteristic is the 1553 Test Page.)

The program assumes knowledge of the location of the Token Ring system table, where it obtains some of its parameters. A byte variable in the Transmit Parameter List table header called `xmtActiv` is used to hold off network activity of the token ring driver while the chipset is being initialized and opened onto the network. The program also assumes knowledge of the addresses of the token ring chipset registers. It uses pointer references to access the `TRING` table and the chipset. At this writing, these addresses are as follows:

`TRING` table base address	`$00105000`
xmtActiv byte variable	`$00105C20`
Base of chipset registers	`$FFFFFC10`

Off-network operation

It may occasionally be useful to run the system without being on the network.

One can remove the token ring interface board from the VME crate. The system should still run in its stand-alone fashion without using the network. Data requested from other nodes will not be found, just as if the other nodes were not on the network. But data is still collected, applications are run, and alarm scanning is performed. To make use of such alarms, one would probably want to enable the local alarms generation on the bottom line of the screen and/or through the local serial port.

Another way to inhibit the use of the network is to disable the automatic call-up of the Token Ring Page by changing the entry point address for Page T, or by moving the application to a different page. It could still be used manually.

A third approach is to unplug the token ring cable from the token ring board. This would cause the Open to fail, since there is no longer a connection to the network media. Page T would eventually discover this and stop.

A fourth option is to simply manually exit from the token ring page before it completes its job of opening onto the network. Local console activity is still permitted even while the page is running automatically. Just press the Home key on the keyboard and exit the page.